Import Response And Inflationary Pressures In The New Economy: The Quantity Theory Of Money Revisited

Emmanuel I.S. Ajuzie, Lincoln University
Felix M. Edoho, Lincoln University
Wensheng Kang, University of Missouri
Matthew N. Uwakonye, Grambling State University
Ghebre Y. Keleta, Grambling State University

ABSTRACT

Contending with the rationale for rate increases to counter inflationary pressures, this study revisits the quantity theory of money and the equation of exchange developed in the sixteenth century by the likes of John Locke, John Law, etc., and popularized over the years by economists, such as Adam Smith, David Ricardo, and Irvin Fisher to predict the response of some variables, especially imports of goods and services, on the rate of inflation. The vector autoregression (VAR) process was used to estimate the model. Results show that import is significant in its impact in the reduction of the growth rate of CPI inflation, thereby dampening the weight of inflationary pressures on economic policy formulations. Because of present economic environment, coupled with author's fulfilled seven-year prediction, the urgency of incorporating this into our economic policy determination cannot be overemphasized.

Keywords: Inflation, inflationary pressure, response, import response, interest rate, consumer price index, quantity theory of money, vector-autoregression, impulse response function, equation of exchange

INTRODUCTION

The concept of the Quantity Theory of Money (QTM) began in the 16th century. Writing at the time, Jean Boldin (reprinted 1924) argued that among the reasons for the rise in French prices were abundance of gold and silver, monopolies, scarcity, the pleasure of princes, and debasement of the coinage. He contended that prices had risen higher than they were in France fifty years earlier. He was primarily interested in determining the causes of the price rise. Boldin believed that the amount of gold and silver, which was used as currency in his time had increased substantially and that, consequently, prices had risen. His was one of the first statements that linked price movement to movements in money stock (Klein, 1970). He noted that the increase in the supply of money caused an increase in demand for French goods, resulting in the increase of prices at home and abroad.

In the 1690s, John Locke advanced monetary theory beyond Boldin (Locke, 1692). He extended the discussion by examining the effects of money on trade, the role of the demand for money, and the importance of interest rate on the economy. He believed that money is a medium of exchange in trade (Klein, 1970) and that the amount needed depended on the "quickness of circulation", which we today refer to as "velocity" of circulation. He went on to define interest as the price for the hire of money, noting that the level of money depended on the relationship between demand and supply of money. Thus, when demand for money exceeded the supply, interest rate was higher and vice versa.

In *Money and Trade Considered* (Law, 1705), John Law argued that "trade depends upon money". In effect, the more money there is in the economy, the more 1ikley we are to have full employment (Klein, 1970). Law extended his argument from coin to bank notes by claiming that the more "credit money" in circulation, the more people will be employed. It followed then that in a period of less than full employment, the monetary authority could put more money into circulation to induce full employment. He did not advocate unlimited issue of paper

money but one suitable just for trade and tagged to total value of land. While some economists saw flaws in his analysis, it was agreed that his contribution to monetary analysis was his attempt to establish a positive relationship between employment, trade, and the amount of metallic and bank money in the economy.

Writing in the 1700s, "On the Nature of Commerce in General" (Cantillon, 1755), Cantillon went beyond his predecessors and considered how money-stock changes affected price. He wanted to find by what "path and in what proportion the increase in money raises the price of things." Thus, he became one of the first to posit that an increase in the quantity of money raises prices through its effect on demand. Apart from the supply of money, he also examined its velocity and concluded, "Acceleration, or a greater speed, in the circulation of money in trade amounts to the same thing as an increase in standard money."

During the nineteenth century economists, such as Thornton, Ricardo, and Mill made a number of contributions to monetary theory. Henry Thornton (1802) assumed that more money resulted in higher inflation and that an increase in money supply did not necessarily mean an increase in economic output. This was and still is the cornerstone argument of the monetarists, that the quantity of money determines the value of money. They believe that a rapid increase in money supply leads to a rapid increase in inflation and that money growth that exceeds the growth of economic output results in inflation, as there is too much money behind too little production of goods and services. In order to curb inflation, therefore, money growth must fall below or equal the growth in economic output.

John Maynard Keynes (1936) challenged the theory, saying that increases in money supply lead to a decrease in the velocity of circulation and that real income, which is the flow of money to the factors of production, increased. Therefore, velocity could change in response to changes in money supply. Many economists who came after him acknowledged that his idea was accurate.

David Ricardo concluded that given a constant supply of money and no change in productivity, an increase in the rapidity of circulation (velocity) will lead to a price level increase (Ricardo, 1950). In his economic recommendation, he felt that the amount of paper money issued should be limited because its overuse would lead to price increases (Klein, 1970).

In his Book III of *Principles of Political Economy* (1909), John Stuart Mill provided economists with a synthesis of classical economics of the nineteenth century. His monetary analysis also concentrated largely on the relation between money and prices. He developed a definition of money that is very close to the definition many textbooks use today. According to him, the value of money depends, other things being equal, upon its quantity and its rapidity of circulation. He added that the purchasing power of money depends first on supply and demand.

QUANTITY THEORY OF MONEY IN THE EARLY TWENTIETH CENTURY

Economists of the early twentieth century continued in the tradition of the nineteenth-century classical economists and believed that the volume of money determines the price level, that relative prices are determined by the supply and demand for real commodities, and that full employment is the normal state of the economy. One of the two ways they advanced monetary theory, which is concerned with in this work is that they formulated alternative analytical approaches to explaining the economic role of money (Klein, 1970).

Irving Fisher formulated the *equation of exchange*, attempted a statement of the quantity theory of money, and developed a theory of business cycle designed to explain economic fluctuations during periods of transition, when prices are rising or falling. The *equation of exchange* could be represented as follows:

$$MV + M'V' = \sum pQ \tag{1}$$

where M is the amount of currency in the economy during a given year, V is the velocity of circulation of this money, M' is the volume of demand deposit in the economy during the year, V' is the velocity of circulation of these demand deposits, and $\sum pQ$ is the sum of (1) the average price, p, of a commodity purchased in the economy during the given year multiplied by the quantity, Q, of it purchased, (2) the average price, p', of another

commodity purchased during the given year multiplied by the quantity, Q', of it purchased, and (3) so forth for all the goods exchanged. Equation (1) is a simple way of expressing the following equation:

$$MV + M'V' = pQ + p'Q'... \quad (2)$$

The popular and contemporary version of the *equation of exchange* used by economists today can be expressed as follows:

$$MV = PQ \quad (3)$$

where *M* is the average amount of money in the economy during a specific period, such as a year, and *V* is the number of times this money is spent on *PQ*, which is the sum of the values of a specific group of goods. Equation (3) is an identity and the difference between Fisher's and the contemporary version lies in the definition for *M* and *QP*, which discussion is outside the scope of this paper.

There are three theoretical assumptions to the restatement of the old Quantity Theory of Money. First, V is fixed with respect to the money supply. Second, the supply of money is exogenous. Third, the direction of causation runs from left to right.

The story of the Quantity Theory of Money then states that since V is fixed and M is exogenous, then an increase in the supply of money will lead exactly to a proportionate increase in the price level. Therefore, money supply expansions only cause price inflation. There have been serious debates as to the veracity of these assumptions and statements. Since the scope of this work would not permit us to delve into all the nuances of the debates, we would turn our attention to the more modern expression of the quantity theory of money. Based on this, we would examine the myth of inflationary pressures in the present economic environment.

CURRENT INVESTIGATION OF THE QTM

In order to lay the foundation for this investigation, we first discuss some assumptions of the theory. First, the quantity theory of money assumes that money is an exogenous variable, one determined by forces outside the model. In other words, changes in money stock, which is determined by the Fed, leads to changes in spending.

Second, the quantity theory of money assumes that the value of velocity of circulation depends not on the amount of money available or on the current price level but on *changes* in price levels. Changes in velocity are possible, however, due to factors such as changes in transportation, new financial institutions, or other exogenous factors. Although velocity of money varies to some extent from year to year, it shows greater stability in the long run and, therefore, it is assumed to be constant or approximately so in this investigation, especially as inflation is a long-run phenomenon.

Finally, the quantity theory assumes that real GDP, or real gross domestic product, is determined by the availability of labor, capital, natural resources, knowledge, and entrepreneurship. The quantity theory assumes not only that markets clear in equilibrium, but also that any adjustment problems are small enough to ignore. In other words, the quantity theory assumes that in the long run the economy tends to full employment.

It is believed that inflation can be best explained in terms of the quantity theory of money, using the equation of exchange as a rudimentary theory of inflation. The theory emphasizes that the money supply is the principal determinant of nominal gross domestic product (GDP). The QTM, in turn, can be explained with reference to the *equation of exchange*. It shows the relationship among money supply, the income velocity of money, the GDP deflator, and real GDP. It is represented as follows:

$$M \times V = P \times GDP \quad (4)$$

where ***M*** is the total amount of money in circulation in an economy at any one time (say, on average during a year). It is here considered as currency (including coins), checkable deposits, and traveler's checks. ***V*** is the velocity of money, i.e., how often a dollar circulates in the system to purchase final goods and services during a year. This

reflects financial institutions and other economic conditions. ***P*** is the *GDP* deflator. It is a weighted average of prices of all final goods and services produced in the economy. It is, therefore, the broadest-based measure of the nation's price level. ***GDP*** is the total market value of final goods and services produced in the economy over the relevant time span, usually one year.

An increase in money supply, through its impact on aggregate demand, results in an increase in nominal *GDP*. If velocity of money is constant, an increase in nominal *GDP* is proportional to the increase in money supply.

In order to determine the impact of an increase in money supply on inflation rate, we rewrite equation (4) to obtain:

$$dM/M + dV/V = dP/P + dGDP/GDP \quad (5)$$

where *dM/M* is the growth rate of money supply, *dV/V* is the growth rate of the velocity of money, *dP/P* is the growth rate of *GDP* deflator and a measure of the inflation rate, and *dGDP/GDP* is the growth rate of real *GDP* or output growth rate. If velocity of money is constant, *dV* and, therefore, *dV/V* equal zero. Equation (5) becomes:

$$dM/M = dP/P + dGDP/GDP \quad (6)$$

Equation (6) states that growth rate of money supply equals the growth rate of inflation plus output growth rate. Rearranging terms and solving for growth rate of *GDP* deflator or inflation rate gives:

$$dP/P = dM/M - dGDP/GDP \quad (7)$$

Equation (7) states that the growth rate of inflation equals the growth rate of money supply minus output growth rate. The growth rate of money supply is determined by the Federal Reserve Bank. Over the business cycle, the growth rate of real GDP varies, but in the long run, however, aggregate supply and the real GDP increase by about 3 percent per year. If the money supply is permitted to grow at 3 percent, it then means that price level will remain constant. If the growth rate of money supply increases too rapidly than output growth rate, inflation occurs. Since there is the tendency for money supply to grow faster than output growth rate, there would remain the perception of inflationary pressure and a hawkish pursuit of remedial measure(s) to stem its attendant economic "woes."

IS INFLATIONARY PRESSURE A MYTH?

In Ajuzie (2001), a historical investigation was developed, which determined that the persistent worry over *inflationary pressures* in the modern economy is a myth and not consistent with history and present global economic reality. Here, we would use the *equation of exchange* to press forward the argument raised in that paper, especially as the Fed then did not heed to its findings and/or recommendations. As indicated in the introductory part of this article, we have moved form the early development of the quantity theory of money to a more inclusive modern framework. As the economy changes, it would behoove us to incorporate these changes as we examine equations developed by our able predecessors centuries ago. At that time, trade between the United States and other nations was essentially none existent, relative to current global economic realities. We might refer to it as a period of closed economy.

As young undergraduate students with major in economics, we were taught two things about inflation, which still ring clear in our heads as if it were yesterday. We have used these principles in communicating economics to students. First and as already discussed, inflation is a monetary phenomenon, meaning that it is the rapid growth of money supply that causes inflation. Second, inflation occurs when too much money is pursuing few goods. In that case, consumers bid up the prices of the few goods and services available. In order for this to occur, domestic demand must be outpacing domestic supply, resulting in bidding wars, general price level increases, inflationary pressures, and inflation.

Again, prior to the 1990s, one could speak of the United States economy as a closed one. International trade was not a serious national economic policy pursuit. By this time, one could easily point to the case of demand outpacing supply as major economic concern, which would lead to inflation and necessitate government action to

correct the phenomenon. From about the middle of the 1990s, the government adopted and effectively and aggressively pursued the policy of open trade relations with the outside world. Trade representatives were sent abroad to implement this policy of openness, bringing to mind Mr. Brown, the Commerce Secretary, who died in a plane crash as he shuttled the globe discussing trade relations. The result is the ballooning trade deficit we observe today. For example, on Monday, December 18, 2006, Commerce Department "reported that the current account trade deficit increased 3.9 percent to a record $225.6 billion in the July-September quarter. That represented 6.8 percent of the total economy, up from 6.6 percent of the gross domestic product in the spring quarter" (AP Writer, 2006).

Where do the goods and services imported into the U.S. go to? We would venture to predict that they go to offset the divergence between domestic demand and supply. This inequality between the aggregates resulted in the constant use of monetary policy instruments, such as increases in short term interest rate, to stave off inflation and/or inflationary pressures. If it is true that the imports go to increase available goods and services domestically, we do then have enough goods and services to blunt not only the shortage in domestic supply, but also the attendant inflationary effects we were taught in our class lectures. When there is not too much money pursuing few goods and services, there would not be a bidding war for existing output and, therefore, general price level (inflation) would not rise and become a major concern as before.

In a study that examined the impact of import prices on CPI inflation, a group of economists from the University of Connecticut concluded that "import prices contributed to disinflation, especially in the late 1990s after the Asian currency crisis (1/2 percentage point on average in advanced economies and more than 1 percentage point in the United States). Import prices also helped to temporarily reduce inflation during the global slowdown in 2001–02."

In his paper, "Globalization and U.S. Inflation," Geoffrey M.B. Tootell (2001) asks the question, where has all the inflation gone for what is getting to be a long time passing? He contended that estimates of the Phillips curve suggested that the low level of unemployment over the past few years should have produced a fairly significant acceleration in prices, yet inflation had continued to decline. In other to explain the cause of this phenomenon, some economists have given various explanations. For example, Robert Gordon (1997) and Staiger, Stock, and Watson (1997), take this occurrence as evidence that the non-accelerating-inflation rate of unemployment, the NAIRU, has declined. Others argue that "special factors, such as recent movements of employee health coverage to health maintenance organizations, have temporarily masked the increase in inflation. Yet, perhaps the most widely cited explanation for the surprisingly good inflation performance of late concerns the increasing sensitivity of the U.S. economy to foreign economic conditions; specifically, that since capacity utilization abroad has been slack in recent years, U.S. inflation has remained mild."

Tootell (2001) used a variety of approaches to examine whether U.S. inflation depends on foreign, rather than domestic, capacity constraints. He showed that foreign capacity plays little, if any, role in the determination of U.S. inflation independent of any role it might play in U.S. capacity utilization. He suggested that monetary policymakers must understand the determinants of inflation in order to attain their inflation goal, arguing that if foreign capacities constraints help determine domestic price increases, then U.S. policymakers should modify their concerns about domestic capacity utilization. This paper fails to see the function of foreign capacity utilization in the present debate on whether inflation still poses a significant threat and a major cause of concern in the present economy of the United States when cheap imports go to blunt the effect of unutilized domestic capacity on upward movement of general level.

The following quotation comes from Tootell (2001). "The inflation of foreign goods prices could also have several indirect effects on U.S. goods price inflation. First, and perhaps most important, price movements of foreign goods should affect the prices of U.S. goods with which they directly compete. In fact, much of the recent debate attributes the surprisingly low current inflation to foreign competition. It has been argued that U.S. producers cannot raise their prices even when cost pressures begin to appear, because doing so when foreign prices remain moderate would seriously diminish their market share." Statements, such as these, go to buttresses the argument that low labor cost, not necessarily capacity utilization, in places such as China, is responsible for low import prices of goods and services, which affect inflation in most industrialized nations, especially the United States.

Whichever way one examines it, some things are clear. There are some factors missing in the formulation of the equation for the determination of inflationary pressures and inflation. If that is the case, why then are we still trying to predict inflationary pressures and inflation the way things were in the closed economy, using the model developed by our distant able predecessors? It is true that there are some other factors that could result in the existence of inflation, but they are not as significant as the key theory that inflation is a monetary phenomenon. Do we then have the same basic argument that we had before to constantly manipulate interest rate as a monetary instrument in the exercise of our monetary policy? Based on the foregoing discussions, we see the continuing pretext for the use of inflationary pressures in our public policy initiatives as a myth.

THE EXTENDED THEORETICAL MODEL

In order to expound on this thought, we would reformulate the *equation of exchange* to incorporate the reality of the new economy by including, in our examination, the impact of imports of goods and services and oil import. Equation (5) above becomes:

$$dM2/M2 + dV/V = dCPI/CPI + dGDP/GDP + dIMP/IMP + dOIL/OIL \quad (8)$$

where all other variables remain as defined and *dIMP/IMP* becomes the growth rate of imports. We use M2 for our money supply measure. Imports here are regarded as the value of all imports of goods and services except oil in a one-month period. *dOIL/OIL* represents the growth rate of oil imports in a one-month period. We replace *P*, the GDP deflator, with *CPI* inflation since it includes import prices and measures inflation pressures before they reach the consumer. Therefore, *dCPI/CPI* becomes the growth rate of *CPI* inflation. By, again, holding the velocity of money constant, equation (8) becomes:

$$dM2/M2 = dCPI/CPI + dGDP/GDP + dIMP/IMP + dOIL/OIL \quad (9)$$

Equation (9) states that the growth rate of money supply equals the growth rate of *CPI* inflation plus output growth rate plus the growth rate of imports of all goods and services except oil plus the growth rate of oil import. Rearranging terms and solving for the growth rate of the CPI inflation gives:

$$dCPI/CPI = dM2/M2 - dGDP/GDP - dIMP/IMP - dOIL/OIL \quad (10)$$

Equation (10) states that the inflation rate equals the growth rate of money supply minus output growth rate minus the growth rate of all imports of goods and services except oil minus the growth rate of oil import. The fascinating thing about this formulation, which is not carried out here, is that one can eliminate oil import to examine only how the import of goods and services affect inflationary pressures and inflation. Similarly, by eliminating imports of goods and services in the equation, one can investigate only the effect of oil import on inflation.

Based on this procedure, it could confidently be said that there would not be any inflationary pressure as long as the economy permits the enormous imports of all foreign goods and services. It does then seem that there is hardly any reason to fight inflation with the same argument used in the "close economy", that we have persistent inflationary pressures. As stated earlier, there are other reasons one can adduce for manipulating or constantly raising short term interest rate. It would be good to focus on those factor(s) in our explanation and not strictly on inflationary pressure. For the past several months, the Fed has not raised interest rate even though there is pressure from some quarters for them to do so. Incredibly, inflation has not been a serious problem as some had predicted.

The following excerpts were taken from the Associated Press Writer, February 14, 2007: "Federal Reserve Chairman Ben Bernanke told Congress Wednesday the economy should grow modestly this year despite lingering pain from a housing slump and he stuck to the Fed's forecast that inflation will continue to ebb. Still, Bernanke wasn't prepared to declare victory and close the door on the possibility of further interest rate increases. Even with recent improvements in "core" or underlying inflation, the situation remains "somewhat elevated," he said. Core inflation excludes the more volatile categories of energy and food.

"Currently, interest rates are at a level that is "likely to foster sustainable economic growth and a gradual ebbing of core inflation," he added. The Fed has held a key interest rate steady at 5.25 percent since August. Before that, the central bank had steadily boosted rates for two years; the longest ever stretch of increases, to fend off inflation. Many economists predict the Fed will leave rates alone for much of this year and said the Fed chief's testimony would support that approach. "Core" inflation, meanwhile, should ease to between 2 percent to 2.25 percent, which would be down from 2.3 percent last year.

"Sen. Richard Shelby, R-Ala., said that when Bernanke took the Fed helm last year there was debate over whether the central bank could successfully accomplish a tricky maneuver: getting the economy to slow sufficiently to thwart inflation but not so much as to fall into recession. "The economic data in recent weeks tells us that the debate is all but over," Shelby said."

Many economists and press writers may read different meanings into the excerpts above. But this article would contend that the highest good that Chairman Bernanke did to interest rate, inflation, and the economy, overall, was to leave short term interest rate alone since August 2006. Sen. Shelby's expression above that "economic data in recent weeks tells us that the debate is all but over," comes when interest rate was left untouched for more than seven months.

The Commerce Department reported Tuesday, February 13, 2007 that "the gap between what America sells abroad and what it imports rose to a record $763.6 billion last year, a 6.5 percent increase from the previous record of $716.7 billion set in 2005." For December 2005, the deficit rose a larger-than-expected 5.3 percent to $61.2 billion. Last year, 2006, was the fifth straight year of record trade deficit, reflecting a huge jump in America's foreign oil bill and a record trade imbalance with China. According to Barton (2006) "the goods produced by a seeming endless procession of minimal wage labor flocking in from the rural areas of China, are the sole reason why the developed economies have not experienced horrendous price inflation over the past ten years. Western governments have printed their currencies far in advance of that justified by increases in their own countries production." This follows the principle of comparative advantage under which international trade is possible. United States would not be spending so much on goods and services from abroad if it was cheaper to produce them domestically. The imported cheaper goods and services go to offset what would have been a damaging spillover effect of higher prices of fossil fuel imports on consumers.

The Associated Press excerpts on Chairman Bernanke's remarks, coupled with The Commerce Department report, go to support the call in this paper for a refocus of the theoretical methodology for predicting inflationary pressures and inflation in the economy. We believe that the model formulated here would provide the framework needed to accurately predict what inflation, and hence, economic future would be, not only in the United States, but also in the rest of developed economies.

THE EMPIRICAL MODEL

I order to demonstrate that the theory is foundational to how we should perceive and formulate inflation and interest rate policies; we propose empirical application. The dynamic model of the macro-economy used is the Vector Autoregressive (VAR) estimation procedure. It involves running three-step analyses, namely:

- Test the stationarity for each variable
- Finding that variables are stationary, use the VAR model for estimation
- Based on the VAR estimation, perform the impulse-response function for forecast and policy analysis.

The mathematical representation of the VAR is:

$$y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + Bx_t + \in_t \qquad (11)$$

where y_t = (CPI, GDP, IMP, M2, OIL) is a vector of endogenous variables, the x_t is a vector of exogenous variables (we let a constant be the only exogenous variable in our model). The A_1, A_2, …, A_p are matrices of coefficients to be estimated, and ε_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables.

The Akaike Information Criterion (AIC) was used to specify the optimal lags as 2 in the VAR system.

The impulse-response function is used for forecast and policy discussion. We use the generalized impulse-response function (Pesaran, M. H. and Shin, Y., 1997) which does not depend on the Cholesky order selection as the simple impulse-response generation. A shock to the i-th variable not only directly affects the i-th variable but is also transmitted to all of the other endogenous variables through the dynamic (lag) structure of the VAR. An impulse response function traces the effect of a one-time shock to one of the innovations, ε_t , on current and future values of the endogenous variables.

The impulse-response function is plotted in 12-lags/months with 2-standard deviation. For example, the response of CPI to oil prices implies that a shock in oil prices has an immediate positive effect up to 0.1% on overall consumer prices. The impact effect declines and reaches a slight negative effect in 3 and 4 months, then the effect dies out and the consumer price goes back to the equilibrium.

The stationarity was performed using the Augmented Dicky-Fuller (ADF) model, which can be specified as follows:

$$\Delta y_t = \alpha y_{t-1} + \delta x_t' + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \ldots + \beta_p \Delta y_{t-p} + v_t \quad (12)$$

The null hypothesis is Ho: $\alpha=1$, and the *y* denotes each variable. All tests reject the unit-root hypothesis at 1% significance level, so we confirm that all variables are stationary and a VAR can be specified and used to run the regression analysis.

DATA SOURCE

Secondary data was collected on five variables, namely consumer price index (CPI inflation), Money supply (M2), real gross domestic product (GDP), imports of goods and services (IMP), and value of crude oil imports (OIL). Because of the changes in the measurement of these variables for different periods, we were able to find them to harmonize or reported similarly from January 1993 through June 2007. Therefore, monthly data were collected on these variables, yielding a total of 173 observations. The quarterly GDP data were extrapolated to monthly data. Then the data on the five variables were converted to growth rates for purposes of estimation, resulting in a reduction in the number of observations to 172. The sources of the data are the Bureau of Economic Analysis (BEA), Bureau of Labor Statistics, and US Bureau of the Census.

RESULT

Table 1 below is the augmented Dickey –Fuller (ADF) Test. As stated above, the tests reject the null-root hypothesis at 1% significance level. This led to the confirmation that all variables are stationary and that VAR could be specified.

Table 1: Augmented Dickey-Fuller Test (Null Hypothesis: Has a Unit Root):

Variable	t-statistics
CPI	-10.48***
GDP	-11.04***
IMP	-5.91***
M2	-4.87***
OIL	-14.79***

Notes: The *** denotes the significance at 1%, and the Augmented Dickey-Fuller test statistics is -3.47, -2.88, and -2.58, and 10% significant level, respectively.

Table 2: Vector Autoregression Estimates

	CPI	M2	GDP	IMP	OIL
CPI(-1)	0.513452***	-0.125782**	0.131324**	0.704659**	12.11667***
	(0.07918)	(0.09048)	(0.08759)	(0.49412)	(3.33350)
	[6.48436]	[-1.39015]	[1.49929]	[1.42608]	[3.63482]
CPI(-2)	-0.376795***	-0.078777	-0.137783**	-0.002246	1.804611
	(0.08216)	(0.09388)	(0.09089)	(0.51271)	(3.45887)
	[-4.58605]	[-0.83909]	[-1.51602]	[-0.00438]	[0.52173]
M2(-1)	-0.095158**	0.259286***	0.015038	-0.703566***	-1.313540
	(0.06796)	(0.07765)	(0.07517)	(0.42406)	(2.86082)
	[-1.40030]	[3.33912]	[0.20005]	[-1.65913]	[-0.45915]
M2(-2)	0.044748	0.209371***	0.076947	-0.697153***	-1.239510
	(0.06747)	(0.07710)	(0.07464)	(0.42106)	(2.84058)
	[0.66319]	[2.71551]	[1.03092]	[-1.65572]	[-0.43636]
GDP(-1)	0.040068	-0.083383	0.189973***	1.135565***	2.106679
	(0.06960)	(0.07953)	(0.07699)	(0.43433)	(2.93011)
	[0.57568]	[-1.04842]	[2.46746]	[2.61453]	[0.71898]
GDP(-2)	-0.056421	-0.257905***	-0.066883	-0.159706	-2.542365
	(0.07112)	(0.08127)	(0.07867)	(0.44382)	(2.99417)
	[-0.79329]	[-3.17342]	[-0.85012]	[-0.35984]	[-0.84911]
IMP(-1)	-0.021299**	0.011856	-0.001357	-0.192646***	0.602746*
	(0.01358)	(0.01552)	(0.01502)	(0.08476)	(0.57179)
	[-1.56817]	[0.76388]	[-0.09031]	[-2.27294]	[1.05414]
IMP(-2)	0.016233*	7.43E-05	0.040271***	-0.112274**	0.412553
	(0.01338)	(0.01529)	(0.01480)	(0.08347)	(0.56314)
	[1.21353]	[0.00486]	[2.72156]	[-1.34502]	[0.73260]
OIL(-1)	0.001320	0.001386	0.001255	-0.002541	-0.274711***
	(0.00205)	(0.00234)	(0.00226)	(0.01278)	(0.08619)
	[0.64457]	[0.59225]	[0.55398]	[-0.19892]	[-3.18728]
OIL(-2)	-0.001539	0.000802	-0.000782	0.000574	-0.060292
	(0.00201)	(0.00230)	(0.00222)	(0.01254)	(0.08462)
	[-0.76550]	[0.34909]	[-0.35174]	[0.04574]	[-0.71250]
C	0.002182***	0.003543***	0.001567***	0.011350***	-0.003661
	(0.00052)	(0.00060)	(0.00058)	(0.00326)	(0.02199)
	[4.17852]	[5.93660]	[2.71273]	[3.48234]	[-0.16651]
R-squared	0.259525	0.226725	0.095806	0.106886	0.125778
Adj. R-squared	0.213245	0.178395	0.039294	0.051066	0.071139
Akaike information criterion		-34.00174			

Notes: The ***, **, and * represents the significance at the 5%, 10%, and 15% level, respectively. The (.) is the standard error and [.] is the corresponding t-statistics.

Table 2 represents the VAR estimation, which uses the Akaike Information Criterion (AIC) to specify the optimal lags as 2 in the VAR system. The (.) represents the standard error and the [.] denotes the test-statistics.

The VAR regression estimate is based on past information. It is a 5-GLS regression systematically, so each column is one corresponding variable/regression estimate. For example, the estimate of CPI is:

$$CPI_t = 0.51*CPI_{t-1}-0.38*CPI_{t-2}-0.095*M2_{t-1}+0.04*M2_{t-2}+0.04GDP_{t-1}-0.06*GDP_{t-2}-0.02*IMP_{t-1}+0.016*IMP_{t-2}+0.001*OIL_{t-1}-0.002*OIL_{t-2}+0.002 \ldots \quad (13)$$

For instance, we can tell that an increase of imported goods last period has a significantly negative effect, -0.021, on CPI inflation.

A calculation of the rate of reduction of the CPI inflation based on (13) yields -0.03. In other words, the impact of all the variables on CPI inflation is a reduction in the growth rate of CPI inflation by -0.03 in the last three months of April through June 2007. Since the impact of GDP and OIL are statistically insignificant and contributed only -0.01 in the rate of reduction of CPI inflation, one can confidently conclude that the reduction in CPI inflation is directly attributable to the impact of the imports of goods and services, which is established to be statistically significant at 10 percent level.

Other variables could be calculated similarly. For example, the estimate of M2 is as follows:

$$M2_t=-0.126*CPI_{t-1}-0.078*CPI_{t-2}+0.26*M2_{t-1}+0.21*M2_{t-2}-0.08GDP_{t-1}-0.26*GDP_{t-2}- \quad (14)$$ $$0.01*IMP_{t-1}+0.00007*IMP_{t-2}+0.001*OIL_{t-1}-0.0008*OIL_{t-2}+0.002 \ldots \quad (14)$$

THE IMPULSE RESPONSE FUNCTION

We present the model-generated impulse responses of the variables, especially of CPI to import of goods and services (IMP). The responses are shown in Figure 1. The impulse-response function is a forecast for the future economy based on all current information. For instance, an unexpected increase in the import of goods and services at time t=0 has an immediately positive effect on CPI inflation at time t=0. Over time, t=1, 2, the effect is gradually decreased and the innovation effect at time t=0 on CPI inflation disappears at time t=3. The impulse response of CPI to itself and to the other variables M2, GDP, IMP, and Oil are reported along the first row of Figure 1. It would be reasonable to suggest that a sudden increase in the import of goods and services is seen as an illusion of economic expansion, so it increases the CPI inflation immediately, but this immediate effect will decrease and die off with the real fact reorganization or economic stabilization over time, approximately within three months.

The impact of M2 and GDP on CPI inflation is insignificant, and the effect dies off quickly. The response of CPI to oil prices implies that a shock in oil prices has an immediate positive effect up to 0.1% on overall consumer prices. The impact declines and reaches a slight negative effect in 3 and 4 months, then the effect dies off and the consumer price goes back to equilibrium. The insignificance of the impact of GDP on CPI inflation is symptomatic of the fact that aggregate domestic demand outpaces aggregate domestic supply, a phenomenon that would have led to escalating inflation were we not seeing staggering import of cheap goods and services to augment domestic supply deficiency as evidenced by the skyrocketing US trade deficit.

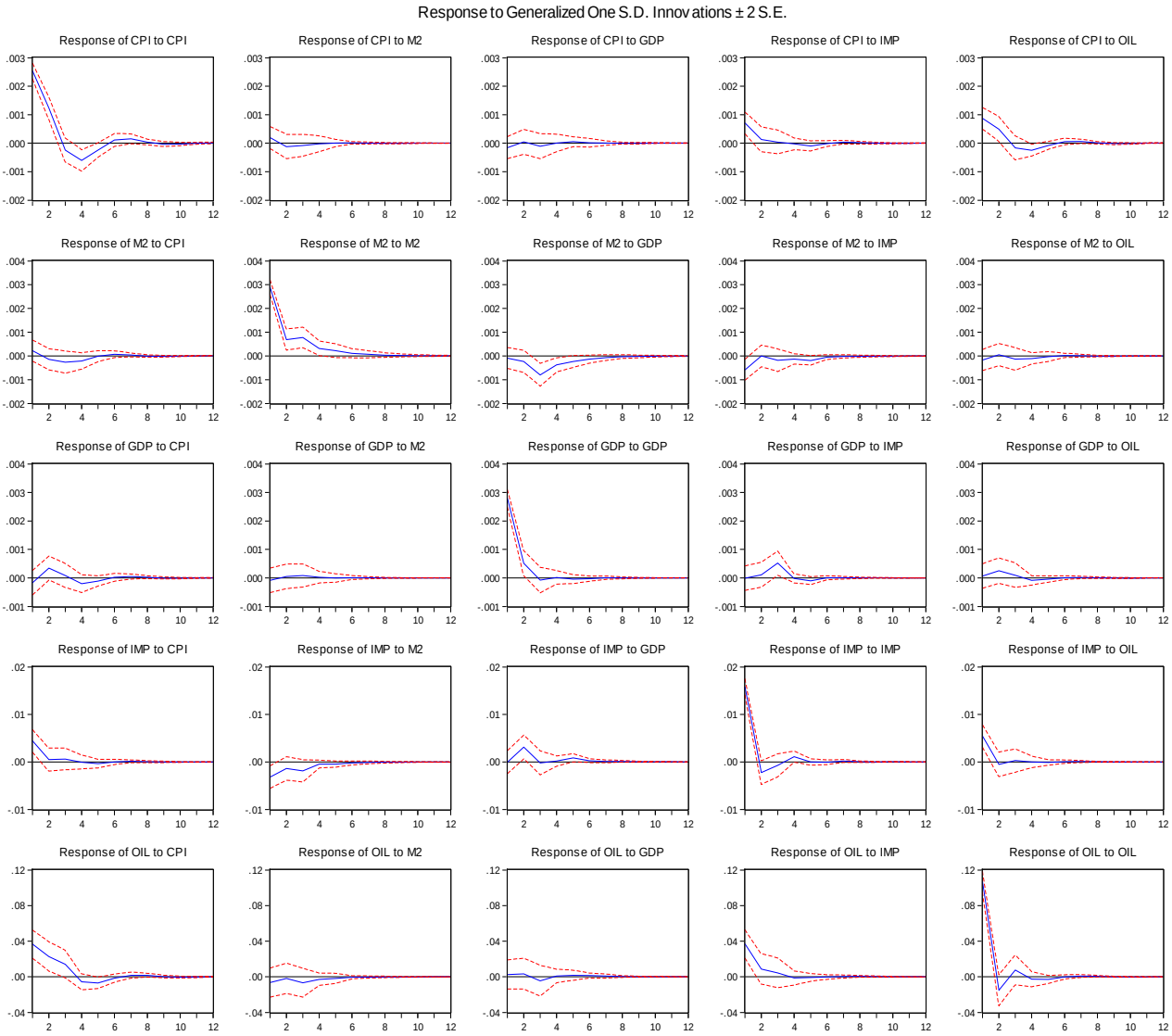

Figure 1: Model and VAR Impulse Response of CPI to IMP and other Variables

Note: Solid lines are the theoretical responses and the broken lines are the VAR responses. The broken lines indicate the 95 percent confidence interval around VAR estimates. The units on the vertical axis denote deviations from the steady-state path. (Olivei, et al, 2006)

POLICY IMPLICATION

In August 2007, the Fed reduced interest rate to stimulate the economy, which has remained sluggish for months. Again on September 18, 2007, the Fed reduced the funds rate by a full half percentage point, resulting in a significant bounce of nearly 2 percent in the stock market. The findings of this study would suggest a continued reduction in interest rate. A systematic reduction in the growth rate of CPI inflation by -0.021 could be used as a benchmark to get the economy on the right track. It would provide us the basis for deciding on any policy initiative that leads to an increase, or a decrease, of interest rate.

In calculating inflation figures, we should be able to take off the derived negative growth rate of imports from CPI inflation. For example, when imports range between $187,834 and $192,676 in millions of dollars as shown in (15) below, we should subtract 2/10 of one percent from CPI inflation to arrive at actual inflation rate.

Bound $192,676 > IMP > $187,834 (15)

By doing so, we would not have the urge to increase interest rate unduly to fight inflation. If imports vary outside the given bound in (15), it would be necessary to recalculate the impact of the growth rate of imports on CPI inflation and this is quite easy to do, using equation (13). It is confirmed here that the imports of goods and services have significantly provided us enough cushion from inflationary pressures and inflation, which would have been staggering otherwise.

SUGGESTED POLICY INITIATIVES TO IMMEDIATELY COMBAT FOSSIL FUEL PRICE INCREASES

On January 2, 2008 it was reported that the price of oil rose to $100.00 per barrel, for the first time, before retreating to approximately $98.00. It climbed back to more than $100.00 again the following day. It seems then that drastic measures must be taken immediately to combat the threat from oil induced inflationary pressures. To prevent the economy from spiraling into disaster the following are suggested measures to address this growing subversive economic trend:

1) Immediately lower interest rate by at least 1.5 percentage points. From there, begin using the bound in equation (15) as indicator of .02 rate reduction or increase, depending on whether imports are above or below the bound, respectively.
2) Seek for the extension of the importation of cheaper goods and services in other sectors of the economy.
3) In the short run, identify a foreign country where cheap labor could be used to expand cheaper production of corn for use in ethanol production. It is assumed that such reduction in ethanol production cost would be transferred to the consumer and lead to a significant reduction in fossil fuel import.
4) As much as it is legally possible, legislate against speculating in oil prices at the Mercantile Houses. Such speculation is helping to fuel the unprecedented rises in oil prices. It does not seem as if OPEC is totally responsible for the ongoing increases in oil prices.
5) Create a process which would officially grant temporary annual permits to migrant workers to enter the country and work at competitive wages to help put downward pressure on sectorally specific hourly wage rates.

These measures would aim at reducing consumer prices through domestic labor cost reduction, especially in the sectors that generate a lot of consumer purchases, such as food. They would further offset the increases in fossil fuel prices. For example, consumers would apply the savings from cheaper goods and services toward the purchase of fossil fuel in the short run as improvement is continuing toward greater efficiency in the production of alternative renewable fuel and other sources of energy.

SUMMARY AND CONCLUSION

The Quantity Theory of Money states that there is a direct relationship between the quantity of money in an economy and the level of prices of goods and services sold. If the amount of money doubles, price levels also double, causing inflation. This is to say that inflation is a monetary phenomenon. In other words, when too much money pursues few goods we experience general price level increases, which lead to inflationary pressures and to inflation. In the more or less "closed economy" of the United States prior to the 1990s, it was possible to predict with a great deal of accuracy the occurrence of business cycles and inflation. Because of the deliberate measures taken to engage in international trade between the United States and the rest of the world in the 1990s, there has been a change in "random walk" in the economy, making it impossible to predict business cycles with previous accuracy. The influx of foreign goods and services has made it unnecessary to employ the original model(s) developed by our able early 20th century predecessors to determine the existence of inflationary pressures, necessitating the persistent use of monetary instruments as in the past to manipulate the market to curb inflation.

This paper suggests the inclusion of the value of import of goods and services and the value of oil imports on the right-hand-side of the equation of exchange to accurately measure the presence of inflationary pressures and/or inflation and to be able to determine when and if it would become necessary to change or recalculate the reduction rate of CPI by (e.g., by -.02%). This is important because as domestic demand tends to outpace domestic supply, foreign goods and services flow in to augment the shortage in domestic supply, thereby reducing or even eliminating the possibility of general price level increases and/or inflation. This effect on general price level is even more significant when we take into consideration the remarkably lower prices of these imported goods and services. Such economic underpinnings would indicate that since the middle of the 1990s, we have not had a case where the growth in money supply has outpaced the combined growth in domestic output and foreign imports of goods and services, thus the emphasis on inflationary pressures, which has necessitated constant rate increases in recent times, has been a myth. Therefore, the use of rate increases to address "phantom" inflationary pressures should be handled with greater care in order not to unnecessarily stifle economic growth mostly through its consequences in the housing market and other growth indicator investment sectors.

The Fed has left interest rate untouched in the past year and we have witnessed escalating oil price increases. It is remarkable that we have not noticed troubling inflationary pressures, which was a constant problem of the previous Fed administration. Inflation itself has been tame according to financial reports. For example, the Labor Department reported on Friday, December 15, 2006 that "inflation stayed docile for a third straight month in November and the costs of everything from new cars, and airline tickets to food and clothing have remained lower." It also reported that Core inflation, which "excludes energy and food, was unchanged in November, the best showing in 17 months," adding that "the inflation scare of 2006 is over" (Associated Press, 2006).

These have given impetus to the stock market rising to new highs. For example, it was reported on Friday, December 15, 2006 that "Wall Street extended its rally Friday after reports showed inflation remained tame in November and industrial production rose for the first time in two months amid increased output by automobile makers" (AP, 2006). Again, based on the theoretical concept developed above, we are advocating caution in the use of inflationary pressure as a pretext for rate increases because, again, the influx of cheap foreign goods and services eliminate general price level increases in the economy, sectoral price increases, such as oil, not withstanding. Again, if we fail to take into consideration the enormous cheap goods and services flowing into this country monthly and annually, we would never be able to accurately predict whether or not we have inflationary pressures, let alone inflation.

Instead of pretending that the unparalleled influx of goods and services into the United States does not have any effect on the economy, visa avis inflation and interest rate, we should become proactive by beginning to investigate what will happen when the effect of massive western currency inflation is no longer cushioned by imported Chinese price deflation? The answer would be much, much higher retail prices in the western world. Those higher prices, coupled with the high levels of personal debt in countries such as the US, UK and Australia, are going to produce serious financial hardships (Barton, 2006).

If we factor in accurately the effects of ongoing rises in the price of oil, things could unquestionably fall apart financially for the individual, and society at large. But, again, the imported cheaper goods and services go to offset the higher prices of fossil fuel imports, thus eliminating the fear of perceived general price level increases. The present push toward efficient renewable energy to offset fossil fuel price increases would remain one of the best alternative energy investments to ameliorate the vagaries of unknown future.

AUTHOR INFORMATION

Emmanuel I. S. Ajuzie, Lincoln University of Missouri, Jefferson City, MO 65102. He is an Associate Professor, working as Research and Extension Economist and teaches Economics for Business and Managerial Statistics at undergraduate and graduate levels. He has authored and co-authored articles and abstracts in refereed journals.

Matthew Nga Uwakonye is an Interim Dean in the College of Business at Grambling State University, Grambling, Louisiana. He does administrative job and at the same time teaches Economics and Statistics. He has authored and

co-authored several articles in refereed journals and conference proceedings in various areas of economics, Agricultural Economics, and Business Administration.

Ghebre Y. Keleta is a professor of Econmics at Grambling State University and teaches Economics and Business Statistics at the undergraduate and graduate levels. He did his graduate work at Colorado State University in Ft. Collins, Colorado. He has been the coordinator of Economics Department and has authored and co-authored research papers in various topics.

REFERENCES

1. Adam, Smith. (1776). An Inquiry into the Nature and Causes of the Wealth of Nations.
2. Ajuzie, Emmanuel I.S. (2000). "Interest Rates and Inflationary Pressures, Real or Imagined: The Reality of Our Time and Implications for Farmers." Lincoln University Faculty Working Paper 01-07.
3. Antoine, Murphey. (1983). Richard Cantillon, Banker and Economist, *Journal of Libertarian Studies.*
4. Aversa, Jeannine. (2007). Bernanke Still Optimistic About Economy, Associated Press Economics Writer. February 14, 2007.
5. Barton, Philip. Import and Inflation. philipbarton@bigpond.com. July 11, 2006
6. Bureau of Economic Analysis for data
7. Bureau of Labor Statistic for data
8. Bolden,
9. Cantillon, Richard. (1755) *Essai sur Nature du Commerce en General*, p. 160.
10. Crutsinger, Martin. (2006). Consumer Inflation Docile for Third Straight Month. Associated Press Economics Writer. December 15, 2006.
11. Fisher, Irvin. (1911) Purchasing Power of Money: Its Determination and Relation to Credit, Interest and Crises, *American Economic Review.*
12. Fisher, Irvin, (1911). The Equation of Exchange, 1896-1910, *American Economic Review.*
13. Fisher, Irvin, (1911) Recent Changes in Price Levels and Their Causes, *American Economic Review* – Discussion.
14. Fisher, Irvin, (1913). The Equation of Exchange for 1912, and Forecast, *American Economic Review.*
15. Friedman, Milton and Schwartz, Anna J. (1965). *The Great Contraction 1929–1933*, Princeton: Princeton University Press.
16. Gordon, Robert J. 1977. "Can the Inflation of the 1970s Be Explained?" Brookings Papers on Economic Activity, vol. 8, pp. 253-77.
17. Heakal, Reem. (January 7. 2005). What Is the Quantity Theory of Money? *Investopedia.*
18. Hume, David. (1752). Of Interest, In *Essays*, pp. 297-7.
19. Keynes, John Maynard. (1936). General Theory of Employment, Interest, and Money.
20. Klein, John J. (1970). Money and the Economy, 2nd Ed. Harcourt, Brace & World, Inc., New York.
21. Law, John. (1705). Money and Trade Considered.
22. Liggo, Leonard P. (1983). Richard Cantillon and the French Economist: Distinctive French, *Journal of Libertarian Studies.*
23. Locke, John. (1692). Consequences of the Lowering of Interest and Raising the Value of Money.
24. Locke, John. (1695). Further Consideration Concerning Raising the Value of Money.
25. Mill, John Stuart. (1909). Principles of Political Economy, Ashley Edition, London Longmans Green, p 485.
26. Moomaw, Ronald L. and Kent W. Olson. (2007). Economics and Contemporary Issues. 7th ed. Thomson, South-western.
27. Newcomb, Simon. (1872). Review of Jevons's Theory of Political Economy, *North American Review.*
28. Olivei, Giovanni and Silvana Tenreyro. (2007). The Timing of Monetary Policy Shocks. *American Economic Review.* June 2007, Volume 97, Number 3, pp. 636-663.
29. Ricardo, David. (1810). The High Price of Bullion, a Proof of the Depreciation of Bank Notes.
30. Smets, Frank and Rafael Wouters. (2007). Shocks and Friction in US Business Cycles: A Bayesian DSGE Approach. *American Economic Review*. June 2007, Volume 97, Number 3, pp. 586-606.

31. Staiger, Douglas, James H. Stock, and Mark W. Watson. (1997). "The NAIRU, Unemployment, and Monetary Policy." Journal of Economic Perspectives, vol. 11, no. 1, pp. 33-50.
32. Tootell, Geoffrey M.B. 1998. "Globalization and U.S. inflation." Federal Reserve Bank of Boston, New England Economic Review, July.
33. Tootell, Geoffrey M.B. 1994. "Restructuring, the NAIRU, and the Phillips Curve." Federal Reserve Bank of Boston, New England Economic Review, September/October, pp. 31-44.
34. Thornton, Henry. (1802). An Enquiry into the Nature and Effects of the Paper Credit of Great Britain, pp. 196-96.
35. U.S. Census Bureau
36. Wicksell, Knut. (1907). The Influence of the Rate of Interest on Prices. *Economic Journal*

NOTES

NOTES